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Submarine slope stability assessment of the central Mediterranean continental margin: the Gela Basin

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Content :

This study investigates slope stability for a relatively small scale (5.7 km², 0.6 km³), 8 kyr old landslide named Northern Twin Slide (NTS) at the slope of the Gela Basin in the Sicily Channel (central Mediterranean). The NTS is characterized by two prominent failure scars, forming two morphological steps of 110 m and 70 m height. Geotechnical data from a drill core upslope the failure scar (GeoB14403) recovered sediments down to ~52 m below seafloor (mbsf). The deposits show low overconsolidation ratio (OCR = 0.24-0.4) and low internal friction angle (20-22°) around 28-45 mbsf, which suggests this mechanically weak interval may act as potential location of instability in a future failure event. Oedometer tests attest the sediments are highly underconsolidated and the average overpressure ratio (U) is ~0.7. Slope stability analyses carried out for different scenarios indicate that the slope is stable both under static undrained and drained conditions. A relatively small horizontal acceleration of 0.03-0.08 g induced by an earthquake may be sufficient to cause failure. We propose that moderate seismic triggers may have been responsible for the twin slide formation and could also cause mass wasting in the future.

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